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PSYCHOLOGICAL LITERATURE.

Psychologische Schulversuche mit Angabe der Apparate. HOFLER und WITASEK. Barth, Leipzig, 1900. pp. viii+30.

The above is, we believe, the first collection of elementary psychological experiments published in German. It consists of directions for seventy-five simple experiments, and is designed for use in gymnasia, normal schools, and similar institutions where students begin the subject. For the sake of having some systematic order of presentation the authors have followed the *Psychologie* of Höfler, and cross references are made to both the larger and smaller forms of that work. The experiments have all proved their value in actual teaching, and can be performed with a minimum of apparatus—a considerable number without any. Several are new in form and a few in substance. A list of standard apparatus (with prices as furnished by W. J. Rohrbeck's Nachfolger, Wien I., Kärntnerstr. 59) is appended. The collection is one that should prove valuable to any one engaged in teaching elementary psychology. E. C. S.

On a Flicker Photometer. OGDEN N. ROOD. Science, N. S. VII, 1898, 757-759.

On Color Blindness: On the Application of the Flicker Photometer to the Quantitative Study of Color Blindness. OGDEN N. ROOD. *Ibid.*, 785-786.

On the Flicker Photometer. OGDEN N. ROOD. American Journal of Science, Ser. 4, VIII (1899), 194-198.

On Color-vision and the Flicker Photometer. OGDEN N. ROOD. *Ibid.*, 258-260.

The first and third of these papers describe means by which Prof. Rood's flicker method of photometry may be applied to colored lights, as, for example, those of incandescent lamps, and give experimental data showing the accuracy of the method.

The second and fourth are of more immediate interest to students of color-vision. In the second paper are given results of measurements by the flicker method of the relative brightness of red and green lights as seen by observers known to be defective in the vision of red as compared with the brightness of the same colors as seen by Prof. Rood himself. The differences are of striking amount, the color-blind observers finding the red and green lights respectively about 20%, and 85% as bright as they seemed to Prof. Rood, on the assumption that he and the other observers were equally sensitive to violet blue. Another observer, partially red blind, saw red about 63% as bright as Prof. Rood. The fourth paper gives the results of tests by the same method upon the eyes of "normal" observers. These also showed distinct differences in the relative brightness with which they saw red, green, and violet blue, though the degree of difference was in most cases less than even with the green in the former cases. Classified with reference to green, they form two pretty distinct groups: one in which green is weak compared with red and violet blue, and the other in which it is stronger than either. It would seem that Prof. Rood has here under investigation the same differences of "normal" vision as

have previously been noted by Rayleigh and Donders (see Helmholtz, *Optik*, 2te Aufl., p. 359), and that his flicker photometer offers a particularly convenient method of investigating them. E. C. S.

The Behavior of Unicellular Organisms. H. S. JENNINGS. Biological Lectures from the Marine Biological Laboratory of Woods Holl, 1899. pp. 93-112. Seventh Lecture.

Studies on Reactions to Stimuli in Unicellular Organisms.—VI. On the Reactions of Chilomonas to Organic Acids. H. S. JENNINGS. American Journal of Physiology, III, 1900. 397-403.

Reactions of Infusoria to Chemicals: A Criticism. H. S. JENNINGS. American Naturalist, XXXIV, 1900. 259-265.

In the first of these papers Dr. Jennings considers the behavior of unicellular organisms with a view to determining whether their movements are of such a character as to explain the migrations of cells in the embryo as some embryologists have been ready to assume. In the course of his discussion the author formulates his observations with reference to the activities of these low forms in a clear and interesting manner, illustrating them chiefly by the behavior of paramecia. Three forms of activity are found: "(1) One is the thigmotactic reaction. Starting with the moving infusorian, we find that it reacts to contact with solid bodies of a certain physical texture by suspending part of the usual ciliary motion, so that locomotion ceases and the organism remains pressed against the solid." "(2) If we start with the resting individual, the simplest reaction to a stimulus is the resumption of the usual forward motion. This is the reaction that is produced when the solid substance against which the creature is resting is removed; it is also produced in some infusoria when the posterior part of the body is stimulated mechanically." "(3) The third, and, for our purpose, most important reaction, to which most of the so-called tactic or tropic phenomena are due, may occur in either active or resting animals. It is a reflex consisting of the following activities: the animal swims backward, turns toward one structurally defined side, then swims forward. This reaction is produced by chemical stimuli acting upon any part of the body or upon the entire body at once, by osmotic stimuli, by heat, by cold, by mechanical shock. Its general effect is to take the organism out of the sphere of operation of the agent causing the stimulus, or to prevent it from re-entering." These creatures therefore have a crude adaptation of reflex movements to the nature and place of the stimulus received. Their movements are neither on the one hand the result of mere chemical or physical attractions or repulsions, nor on the other of complex psychic conditions, but are "of the same order as the motor reflexes of higher animals." This is a somewhat different and doubtless better considered statement than that of the author in the final paragraph of his article in this *Journal* (Vol. X, 1898-99, p. 515) where he speaks of them as "comparable in all essentials to those of an isolated muscle." The activities of unicellular organisms being of this reflex character and not of the more purely chemical and physical sort, the writer is inclined to decide against their being useful in solving the original question of cell migrations in the embryo.

The other two papers mentioned above are more or less controversial and devoted to clearing up differences between the observations of the author and those of Garrey, who has also published along nearly the same lines. The author seems successful in showing that the observations of Garrey are in accord with his own general principle quoted as (3) above. E. C. S.